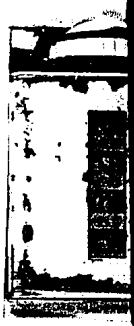
STAT

Sanitized Copy Approved for Release 2011/07/08 : CIA-RDP80-00809A000700250051-6

STAT



SOVIET INDUSTRIAL MINISTRIES SCORED FOR POOR USE OF HIGHER SCHOOLS' RESEARCH POTENTIAL

[Comment: Presented below is the complete text of the article, "Utilize the Scientific Cadres of Higher Schools More Extensively," by Prof N. S. Arzhanikov, Head of the Main Administration of Polytechnic and Machine Building Vuzes, Ministry of Higher Education USSR. The article was published in Vestnik Vysshey Shkoly (Higher School Herald), No 9, September 1955.]

The decision of the July Plenum of the Central Committee of the CPSU points out that "the large number of scientific cadres at higher educational institutions is not extensively used in working out problems in the development of new techniques." An analysis of the condition of scientific research work at vuzes of the Main Administration of Polytechnic and Machine Building Vuzes of the Ministry of Higher Education USSR fully corroborates this situation.

There are over 14,500 scientific workers at the 64 vuzes of the main administration. Among them are many important scientists -- professors, doctors and candidates of sciences. For example, there are at the Moscow Higher Technical School imeni Bauman (MVTU) 50 professors and doctors of sciences and, in addition to these, 175 graduate students are being trained for scientific work. There are 73 professors and doctors of sciences, 365 candidates of sciences, and 190 graduate students at the Moscow Power Engineering Institute, and 87 professors and doctors of sciences, 385 candidates of sciences, and 160 graduate students at the Leningrad Polytechnic Institute.

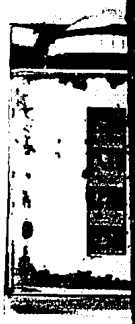
These large scientific collectives are not in the least inferior to those of the more important industrial scientific research institutes, in as much as the vuz collectives have an advantage over their coworkers at branch institutes. This advantage is the potentiality of attracting talented youth from among the students of upper courses to the resolution of scientific and technical problems; the availability, in one collective, of scholars of different specialties affords a thorough resolution of complex problems. In comparison with branch institutes, there is undoubtedly less expenditure entailed in conducting research.

The availability at vuzes, subordinate to the Main Administration for Polytechnic and Machine Building Vuzes, of a great number of scientific workers, and in particular, of workers with high scientific qualifications, provides the premise necessary for the formulation and successful resolution of important scientific and technical problems.

However, all these possibilities are not being fully utilized; vuz collectives do not contribute to industry all that they would be capable of, were there a correct formulation and organization of scientific research work.

The weakness of organizational administration of scientific research work at vuzes on the part of the Ministry of Higher Education, its main administrations, and heads of vuzes must be considered the basic reason for such a situation. The directors of vuzes and workers of main administrations above all are guilty of not having more persistently raised the question of improving the organization and coordination of research work at higher schools.

STAT



The present system of organization and planning of scientific work at these very same vuzes is also extremely imperfect. Plans for this work are frequently drawn up on the principle of including all themes which have been proposed by chairs or departments. Although, recently, plans for impending research have been discussed at vuz council meetings, the discussions have not been of a creative character. This, to a very considerable degree, indicates that criticism and self-criticism is not fully developed among scientific collectives, and that creative discussion is seldom organized. For example, scientific and technical conferences for discussing completed projects are conducted by vuzes annually. However, there have been practically no instances of even one project being rejected at such conferences.

Among the research work conducted at vuzes are many projects which have been devoted to minor, specific problems; as yet, there are too few works devoted to solving major national economic and scientific problems.

Problems of new techniques are worked out only in particular vuzes and by just a few scholars, for example, at the MVTU by members of the chair of welding (project head: Prof G. A. Nikolayev), and the chair of engines (Prof A. S. Orlin), and at the Moscow Power Engineering Institute by members of the chair of turbine building (Prof A. V. Shcheglyayev), and the chair of radio engineering (Academician V. A. Kotel'nikov and Docent A. F. Bogomolov). The chair of aircraft engines (Prof N. V. Inozemtsev) at the Moscow Aviation Institute might be mentioned; also, at the Leningrad Electrical Engineering Institute, the chair of semiconductors and dielectrics (Prof N. P. Bogoroditskiy), the chair of defectoscopy (Prof S. Ya. Sokolov); and at the Leningrad Institute of Precision Mechanics and Optics, the chair of optics (Prof M. M. Rusinov).

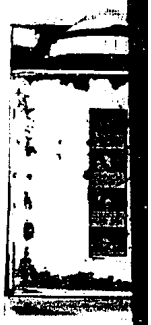
Although the overwhelming majority of the scientific collectives of chairs are carrying out a great volume of research projects (at the present time, there are more than 8,000 research projects being conducted at vuzes of the main administration, of which 1,622 are on contract), they are, to a considerable extent, out of touch with industry. These projects are minor and of pure research in nature.

It cannot be considered normal, for example, that the scientific collective of the chair of machine tools of the MVTU (head: Prof G. A. Shaumyan), which should take the lead in the field of machine tool building, stands aloof from the creative work of the chief designers of the Ministry of Machine Tool Building and Tool Industry and does not maintain close contact with the ministry's scientific and technical council, scientific institutions, OKB [special design bureau] and enterprises.

The special chairs of the Moscow Machine Tool and Tool Institute, for example, the chair of machine tools, headed by Prof N. S. Acherkan, and the chair of press and forge production, headed by Prof V. T. Meshcherin, have not taken their proper place in the development of the machine tool industry.

It should be noted that not even the Ministry of Machine Tool Building and Tool Industry has given the Moscow Machine Tool and Tool Institute sufficient assistance in its development, in equipping its laboratories, and in the formulation of major research projects. The Ministry of the Motor Vehicle Industry does not utilize sufficiently the scientific forces of chairs of the Moscow Automotive Mechanics Institute in working out problems of domestic motor vehicle building.

STAT



Many industrial ministries are not well acquainted with the scientists who work at vuzes and their potentialities for the development of science. It should be specifically pointed out, for instance, that the Ministries of Heavy Machine Building and of Machine and Instrument Building have not come to the aid of scientists at the MVTU, the Leningrad Institute of Precision Mechanics and Optics, the Moscow Power Engineering Institute and other vuzes, and that the Ministry of the Metallurgical Industry does not aid the strong collectives of the metallography and metallurgical chairs of the Leningrad and Ural Polytechnic Institutes.

Apropos of this, the constructive experience of the Ministry of the Aircraft Industry deserves to be publicized. This ministry makes sufficiently extensive use of the scientific assistance of the collectives of the Moscow Aviation Institute and the Moscow Aviation Technological Institute, and in its yearly plans for scientific research takes into consideration the capabilities of these vuzes. It is only desired that this ministry extend its help to these vuzes to equip their laboratories and to show more vigor in attracting workers at peripheral institutes -- Kazan, Khar'kov, Kuybyshev -- to such scientific work.

In this respect, the industrial ministries must consider the experience of capitalist countries, above all the US. It is known that a considerable portion of research in aerodynamics and stability of aircraft, automatics, telemechanics and other fields of engineering are carried out in the laboratories of American universities. It is also well known that US industrialists, understandably motivated by competition, grant large sums of money to provide laboratories of leading universities with the latest equipment, and promote the concentration of a large scientific force in these laboratories, with whose help problems in which they have an interest are resolved. In a number of American higher educational institutions both the basic teaching personnel and the large staff of special scientific workers participate in scientific research work. At the Massachusetts Institute of Technology, judging by its 1954-1955 prospectus, in a number of chairs the list of nonteaching scientific associates runs into several dozens (up to 100 persons). A considerable number of these scientific workers have master and doctor of sciences degrees.

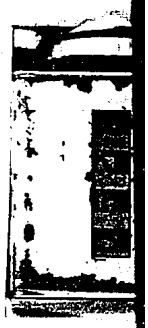
With us the situation is different. The number of vuz scientific workers who are engaged in the solution of problems of a national economic significance is not more than 10 percent. The rest, as has been already stated, either carry on minor research financed by the state budget, or work contracted for by economic enterprises, work connected for the most part with solution of specific production problems.

The explanation for this is that industry assigns complex problems only to a few of the vuzes and then only when such research cannot be fulfilled by other organizations. In other words, the more urgent projects are assigned by ministries to branch scientific research institutes and only the less urgent to vuzes.

The budgetary appropriation for scientific work at vuzes is not sufficient to enable them to carry on serious research. Therefore, it is fully understandable why the findings of research work at vuzes take root so poorly in production; this is explained chiefly by the low degree of urgency of the research which has been done.

The second important reason is that industrial ministries which commission vuz scientific collectives to work out important problems often absolve themselves of any responsibility and concern for material aid necessary to carry out such projects. Recently, several ministries assigned research projects to vuzes without any guarantee of equipment and instruments, and the maintenance of scientific and technical personnel.

STAT



If one considers the poor equipment and the small staffs of scientific and technical personnel (engineers, mechanics, designers, qualified workers, etc) in many vuz laboratories, one is convinced that such a system places the vuzes in a very precarious position. For example, one of the institutes subordinate to the main administration had been contracted by the Ministry for the Construction of Electric Power Stations to determine building parameters for the construction of an important hydroelectric power station. But the ministry, under various pretenses, failed to fulfill its part of the contract, necessitating the institute's completion of the project without any material aid. At the same time, a substantial amount of money had been allocated for analogous work, conducted simultaneously at branch institutes and even at institutes of the Academy of Sciences USSR.

Themes proposed by the vuzes themselves are considered in an even worse light by the economic ministries.

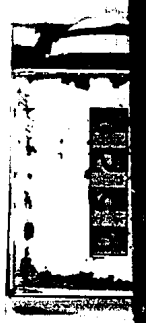
It is true that sometimes individual governmental departments and enterprises readily support research undertaken by vuzes on their own initiative (whenever such work is beyond the capabilities of branch institutes and enterprises). However, once they have the findings of the initial data on the project at their disposal, the "customers" lose interest in it, cease to fulfill their obligations under the contract and, in this way, deprive the vuzes of the possibility of continuing the work.

At the MVTU, Prof V. M. Kovan developed a method for the designation of allowances and tolerances in machining machine parts. This method not only improves the technological process, but results in a significant saving of metal. The method was tested at the [Moscow Motor Vehicle] Plant imeni Stalin with good results. However, it is being introduced very slowly, even at those plants where it was successfully applied.

The [Moscow] "Kompressor" Plant, with the assistance of the chair of foundry production at the MVTU, mastered the casting (instead of forging) of crankshafts; after receiving the first findings, the plant discontinued the project conducted in collaboration with the school, deciding to complete it without the assistance of the scientists. In reality, work was completely suspended and the useful project was not developed further.

The experience of scientific collectives at vuzes in fulfilling the tasks of certain ministries proves that in spite of the extremely limited material and technical aid given these projects, the professors in charge of them have managed to gather about them good scientific workers, and to create special laboratories (albeit not properly equipped), which have made possible the solution of complex technical and scientific problems.

Undoubtedly, such a close bond between the industrial ministries and vuz scientific collectives would have spurred the latter on to the fulfillment of urgent research, would have helped vuzes to establish modern laboratories, supplied with the latest equipment, and to have staffed them with technical personnel. Experience shows that such expenditures would have speedily justified themselves through the utilization of technical improvements developed by scientists.



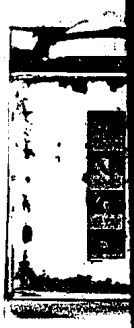
It is necessary to resolutely eliminate the tendency existing in several industrial ministries to conduct all scientific research solely at their own institutes and enterprises. There is no basis for supposing that vuz laboratories, strengthened or established with the help of ministries, will interfere in the work of branch institutes. On the contrary, thanks to the coordination and exchange of experience, the level of scientific work at branch institutes will be raised. Furthermore, such a method permits research to be conducted faster, whereas much of it today is stretched out over a period of many years.

A new method for the electromagnetic stirring of metals in a steel melting arc furnace was developed at the Moscow Steel Institute. This method speeds up considerably the process of sulfur reduction, the "deoxidation" of the bath, and temperature equalization of the bath along the depth of the furnace; facilitates the separation of slag; eliminates the necessity for hand stirring; and allows an appreciable increase in the capacity of the furnaces. However, the introduction of this method has been so slow, thanks to the Ministry of Ferrous Metallurgy, that the planning of such furnaces has only now begun, long after completion of the first successful tests at the Steel Institute and the first foreign news of its use abroad.

The idea of using oxygen to increase the productivity of open-hearth furnaces and to decrease fuel consumption was first introduced by Prof K. G. Trubin (Moscow Steel Institute) in 1926 and is now extensively used in the United States, where the majority of furnaces for some time have been converted to operating with oxygen. In spite of the evident expediency of making extensive use of oxygen in steel production, this method has not yet been adopted by all metallurgical plants in the USSR. For the extensive introduction of this method, oxygen stations must be constructed at all metallurgical plants. The steel output of existing furnaces can be increased by not less than 10 million tons, with a saving of approximately 2 million tons of fuel (in terms of coal). However, the Ministry of Ferrous Metallurgy has not taken practical measures for the expeditious construction of oxygen stations.

Let us take yet another example characterizing the abnormal attitude of certain ministries toward the scientific work of vuzes. Even prior to the Great Patriotic War, the creation of a large scientific research laboratory of high-voltage techniques (based upon the idea of Prof A. A. Gorev, the most outstanding scientist in the field of power engineering) was begun at the Leningrad Polytechnic Institute. It was envisioned that the laboratory would become the base for industrial research in the field of planning and operation of long-distance electric power transmission lines. The laboratory was not finished before the war, and after the war the Ministry of Electric Power Stations discontinued aid to the scientists in the construction of this laboratory. As a consequence, construction has not been completed. If the Ministry of Electric Power Stations had given serious assistance in constructing and equipping this outstanding laboratory, we would have benefited long ago by important scientific and practical findings in the field of high-voltage engineering. Meanwhile, the scientists of Gorev's school must be content with the minor projects which the Ministry of Electric Power Stations assigns to them.

The example cited is very characteristic, and only one conclusion can be drawn: in the future, we cannot tolerate such irrational utilization of the highly qualified specialists at vuzes. To change the existing situation, laboratories must be established for leading scientists, assuring them the necessary equipment and personnel, and the system of financing scientific research work and the system of advances to scientific workers for successful achievements in this field must be changed.



It is absolutely necessary that we organize a series of so-called "special problem" scientific research laboratories at those vuzes and in those specialities where the important scientists work and where there is a creative scientific collective capable of solving national economic tasks. On the basis of the experience of foreign higher schools, the organization of such laboratories plus the supplying of them with modern equipment must be carried out by industrial ministries. Each ministry will have its quota of several such laboratories and their organization will not entail any particular difficulties, as far as material expenditures are concerned. Important research will be carried on in these "special problem" laboratories on the assignment of branch ministries. This will greatly facilitate the introduction of findings of completed projects and will promote a further advance in science and engineering, as well as the correct utilization of vuz scientific forces.

At a forthcoming meeting of its collegium to be held soon, the Ministry of the Petroleum Industry USSR is scheduled to discuss the question of the scientific activity of the chairs of the Moscow Petroleum Institute from the point of view of the capabilities of this vuz for conducting important scientific research. In our opinion, collegiums of economic ministries must follow the example of the Ministry of the Petroleum Industry USSR and, in the near future, discuss the question of enlisting the services of scientists at vuzes in working out problems of new techniques, the coordination of the activity of vuz collectives and their institutes and enterprises, and material aid for various vuz laboratories.

To bring about a fundamental improvement in scientific research work at vuzes, a change in the system of planning and financing such work is necessary.

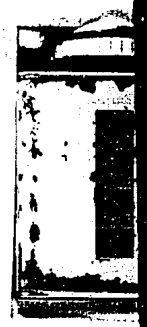
At present, the plan for scientific research work at each institute is drawn up on the basis of the proposals made by enterprises, scientific organizations and ministries for projects to be done on contract, and on the basis of themes suggested by chairs, which themes are supposed to be financed by the budget. Projects (special or of limited practicality) planned on contract are included in the scientific research plan because funds have been allocated for their development; and the proposals of the chairs are included because they promote the scientific growth of instructors, being for the most part dissertations, which are often of an exploratory nature.

The most flagrant shortcoming in the planning of scientific work is the lack of coordination in the research activity of industrial enterprises, academies of sciences, and vuzes, and the lack of any sort of coordination center.

Insufficient information, not only on the progress of foreign science and engineering, but also on projects which have been completed at industrial scientific research institutes, causes great harm to the correct development of scientific work at vuzes. This information is of particular importance for scientific workers at peripheral vuzes.

The existing system for financing contract work is extremely imperfect and does not promote the development of scientific work at vuzes. Each main administration is limited as to the salaries and the number of personnel they are entitled to for carrying out contract work at vuzes. These indices are often determined formally (by comparing the previous year's figures) and not by a comprehensive analysis of the capabilities and needs of vuzes and their laboratories, and without a consideration of the directions scientific research may take, etc. As a result of the limited allocations, the capabilities of vuzes are appreciably lowered and a number of them are forced to turn down interesting and urgent research proposed by the ministries.

[redacted] STAT



In our opinion, the system of setting limits on contract work should be changed. Funds allocated by enterprises and institutions for carrying out work on contract, in whatever volume, must automatically include salaries for engineering and technical personnel, for expenses incurred in the acquisition of equipment and apparatus, etc. In other words, the fund must not be limited, because such a procedure does not foster scientific development.

The introduction into vuzes of a fixed number of personnel, based on definitive norms corresponding to the number of students, would have enormous significance for the extension and improvement of scientific research. Under such circumstances, vuz directors could make on the spot decisions on modifying the teaching work load of scientific and pedagogical workers, decreasing it somewhat (within the limits of the chair) for professors, docents and assistants actively carrying on research work, and increasing it for instructors less active in the scientific sense.

The conditions of scientific research work in our higher schools demands a fundamental change. It is necessary to place vuzes in a position analagous to those branch scientific institutions which carry on research. This problem can be resolved in several ways. No matter what means are selected, it is necessary that vuzes receive their assignments from a central body, assignments aimed at solving new problems of modern science and engineering, and that proposals initiated by scientists be wholeheartedly supported by industry.

* * *

[redacted] STAT